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I also certify that the application is now proceeding in the name as identified herein.

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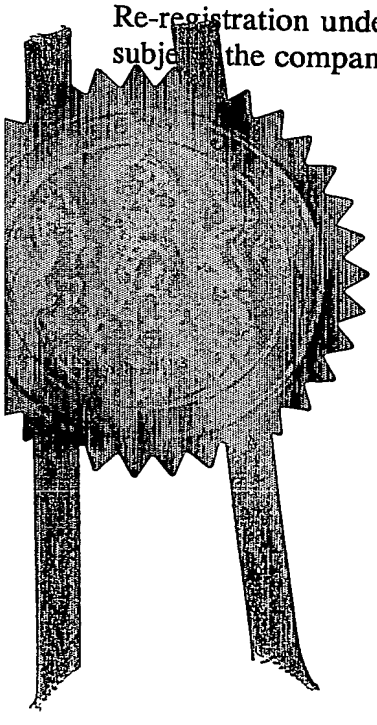

Signed Andrew Gerrard

Dated 1 September 2003

Patents Form 1/77 Rule 4(1

Patents Act 1977
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Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

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1.	Your reference	07AUG02 E739213-1 D03016 BS/DMC/LP01918UK P01/7700 0.00-0218306.9
2.	Patent application number *(The Patent Office will fill in this part)*	0218306.9
3.	Full name, address and postcode of the or of each applicant *(underline all surnames)*	7 AUG 2001 BL-Pegson Ltd Mammoth Street Coalville Leicestershire LE67 3GN
	Patents ADP number *(if you know it)*	8318628001
	If the applicant is a corporate body, give the country/state of its incorporation	England
4.	Title of the invention	Crusher Assembly
5.	Name of your agent *(if you have one)*	~~Lewis & Taylor~~ Mark Clark
	"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*	144 New Walk Leicester LE1 7JA
	Patents ADP number *(if you know it)*	711002
6.	If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or each of these earlier applications and *(if you know it)* the or each application number	Country / Priority application number *(if you know it)* / Date of filing *(day / month / year)*
7.	If this application is divided or otherwise derived from an earlier UK application, give the number and filing date of the earlier application	Number of earlier application / Date of filing *(day / month / year)*
8.	Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'yes' if:* *a) any applicant named in part 3 is not an inventor, or* *b) there is an inventor who is not named as an applicant, or* *c) any named applicant is a corporate body.*	yes

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	4 5
Claim(s)	1
Abstract	
Drawing(s)	3

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translation of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	1
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature Lewis & Taylor Date 07/08/02

12. Name and daytime telephone number of person to contact in the United Kingdom: Brian Spoor (0116) 233 8181

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DUPLICATE

TITLE: Crusher assembly

The present invention relates to a crusher assembly, more particularly, but not exclusively, to a crusher assembly for recycling material.

Quarried material is often processed by means of a crushing plant, for the production of aggregate, for example. A crushing plant may also be used for recycling construction materials such as reinforced concrete and timbers embedded in concrete.

The crushing plant will typically include a crushing chamber having a plurality of jaws movable relative to one another, for crushing material present in the crushing chamber. However, the crushing chamber may become clogged due to wedging or jamming of material to be crushed between the jaws. In particular, steel components from reinforced concrete material can become jammed between the jaws during recycling. If a steel component becomes jammed in the crushing chamber with an end extending from the bottom of the crushing chamber, the extending steel can cause damage to a conveyor positioned beneath the crushing chamber for receiving material which is discharged during crushing. Further, a steel object will often have to be removed manually from the jammed position with cutting torches. The clearing of the crushing chamber in this manner reduces the productivity of the crushing plant and has safety implications for any persons removing such blockages.

It is an object of the invention to provide a crusher assembly which can be cleared mechanically instead of manually, if a blockage occurs during the crushing of recyclable material.

According to the present invention, there is provided a crusher assembly comprising a crushing chamber for receiving material to be crushed and having an outlet for discharging material introduced into the crushing chamber, and a plate mounted adjacent the outlet which is movable relative to the outlet for clearing objects which become blocked in the outlet in use.

Conveniently, the plate is mounted for pivotable movement relative to the outlet, for movement against an object projecting from the outlet in use.

In a preferred embodiment of the invention, the crusher assembly includes a hydraulic cylinder arrangement, which is in communication with the plate, for powered movement of the plate against an objects projecting from the outlet in use, to bend or break the object.

The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic view from the side of part of a preferred embodiment of a crusher assembly according to the invention, showing part of the crusher assembly in cross-section;

Figure 2 is a view similar to Figure 1, showing the deflector plate in an inoperative open position; and

Figure 3 is a view similar to Figure 3, showing the deflector plate in a bending position.

A crusher assembly is generally indicated at 10, which includes a crusher 12 for crushing material and a discharge conveyor, indicated at 14, positioned below the crusher 12 for collecting and discharging material which passes through the crusher 12.

The crusher 12 is a jaw crusher having a frame 16 on which is mounted a fixed jaw 18 and a swing jaw 20. The jaw crusher is of a known construction and will not be described in significant detail. The fixed jaw 18 and swing jaw 20 are supported between opposing walls 22 of the frame 16, only one of which is visible in the figures, and define a crushing chamber 24, for receiving material to be crushed, for example reinforced concrete.

A deflector arrangement, indicated at 26, is provided on the underside of the fixed jaw 18, which consists of a deflector plate 28 and a hydraulic cylinder arrangement 30 in communication with a hydraulic circuit (not illustrated). The deflector plate 28 extends in a clearance fit between the side walls 22 of the frame 16 and includes a wear surface 33. The deflector plate 28 is pivotably mounted on the fixed jaw 18 by pins 34 which pass through brackets 36 provided one on either side of the spacing between the side walls 22.

The hydraulic cylinder arrangement 30 consists of a pair of hydraulic cylinders 38, only one of which is visible in the figures, one positioned on either side of the spacing between the side walls 22, for moving the deflector plate 28, as described below. The upper end of each cylinder 38 is pivotably connected to a respective plate 40 on either side of the spacing between the side walls 22 by pins 41. Each cylinder 38 includes a piston 42 which is reciprocable in the cylinder 38 between a received position, as shown in Figure 2, and a fully extended position, as shown in Figure 3. As can be seen in the figures, the distal end of each piston 42 is pivotably connected to a toe 44 of the deflector plate 28 by pins 46.

In use, the swing jaw 20 moves in a crushing cycle, up and down, as well as towards and away from the fixed jaw 18. Material to be crushed is introduced into the crushing chamber 22 through the top of the crusher assembly 10. The cyclic movement of the swing jaw 20 causes impelling forces for crushing material present in the crushing chamber 22 and crushed material is then discharged under gravity through the spacing between the lower end of the two jaws 18, 20, referred to hereinafter as the outlet.

Figure 1 shows the deflector plate 28 biassed by the hydraulic circuit, via the cylinders 38, to a normal operating position, for deflecting material which passes through the outlet of the crushing chamber 22. As material from the crushing chamber 22 passes through the outlet, it falls onto the deflector plate 28 and is deflected onto the conveyor 14.

If an object, such as a piece of angled steel from a section of reinforced concrete, or a section of timber, enters the crushing chamber 22 during the crushing cycle, the object can become jammed between the jaws 18, 20 and/or the deflector plate 28 in a position extending from the outlet. If this occurs, the hydraulic circuit can be operated to release fluid from the cylinders 38, to allow the deflector plate 28 to move to an inoperative open position, as shown in Figure 2. Thereafter, continued cyclic action of the swing jaw 20 can be sufficient to enable the jammed object to drop down though the outlet and on to the discharge conveyor 14.

If the object is of a greater length than the clearance between the bottom of the crusher 12 and the conveyor 14, the object will be unable to drop on to the discharge conveyor and be carried away with the other material passing through the outlet. In this case, the deflector plate 28 can be moved from the inoperative open position to a bending position, under pressure from the hydraulic cylinders 38, as shown in Figure 3. As the deflector plate 28 is moved pivotably about pins 34 under action of the hydraulic cylinders, up to a pressure of 200 bar for example, the object can be bent or broken around the lower end of the swing jaw 20, which acts as a fulcrum, to allow the object to drop down through the outlet onto the conveyor 14.

If the object is of a length whereby, after a first bending about the end of the swing jaw 20, as described above, the object is not cleared from its position extending from the crushing chamber, the hydraulic circuit can be operated to release the pressure in the cylinders to return the deflector plate 32 to the position in Figure 1. Again, cyclic action of the swing jaw 20 enables the object to drop down further through the outlet, whereby the above-described cycle of movement to and from the bending position in Figure 3 can be continued until the blockage is removed and discharged on to the conveyor 14.

In alternative embodiments in accordance with the invention, not illustrated, the deflector arrangement is pivotably mounted on either on the frame of the crusher or on the conveyor.

The deflector arrangement described above is suitable for use on any form of crusher.

Claims

1. A crusher assembly comprising a crushing chamber for receiving material to be crushed and having an outlet for discharging material introduced into the crushing chamber, and a plate mounted adjacent the outlet which is movable relative to the outlet for clearing objects which become blocked in the outlet in use.

2. A crusher assembly as claimed in claim 1, in which the plate is mounted for pivotable movement relative to the outlet, for movement against an object projecting from the outlet in use.

3. A crusher assembly as claimed in claim 1 or claim 2, in which the crusher assembly includes a hydraulic cylinder arrangement, which is in communication with the plate, for powered movement of the plate against an object projecting from the outlet in use, to bend or break the object.

Figure 1.

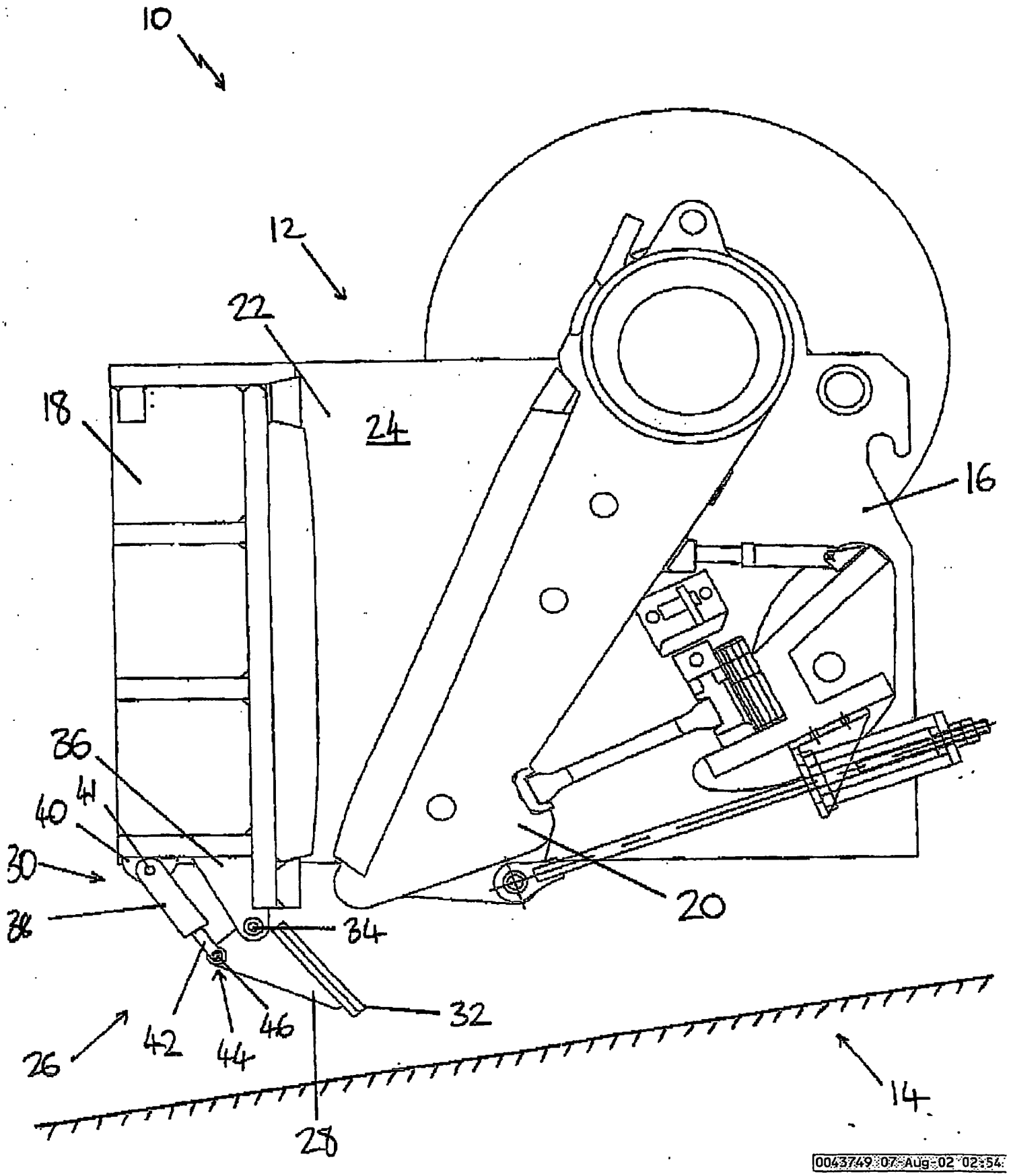

Figure 2

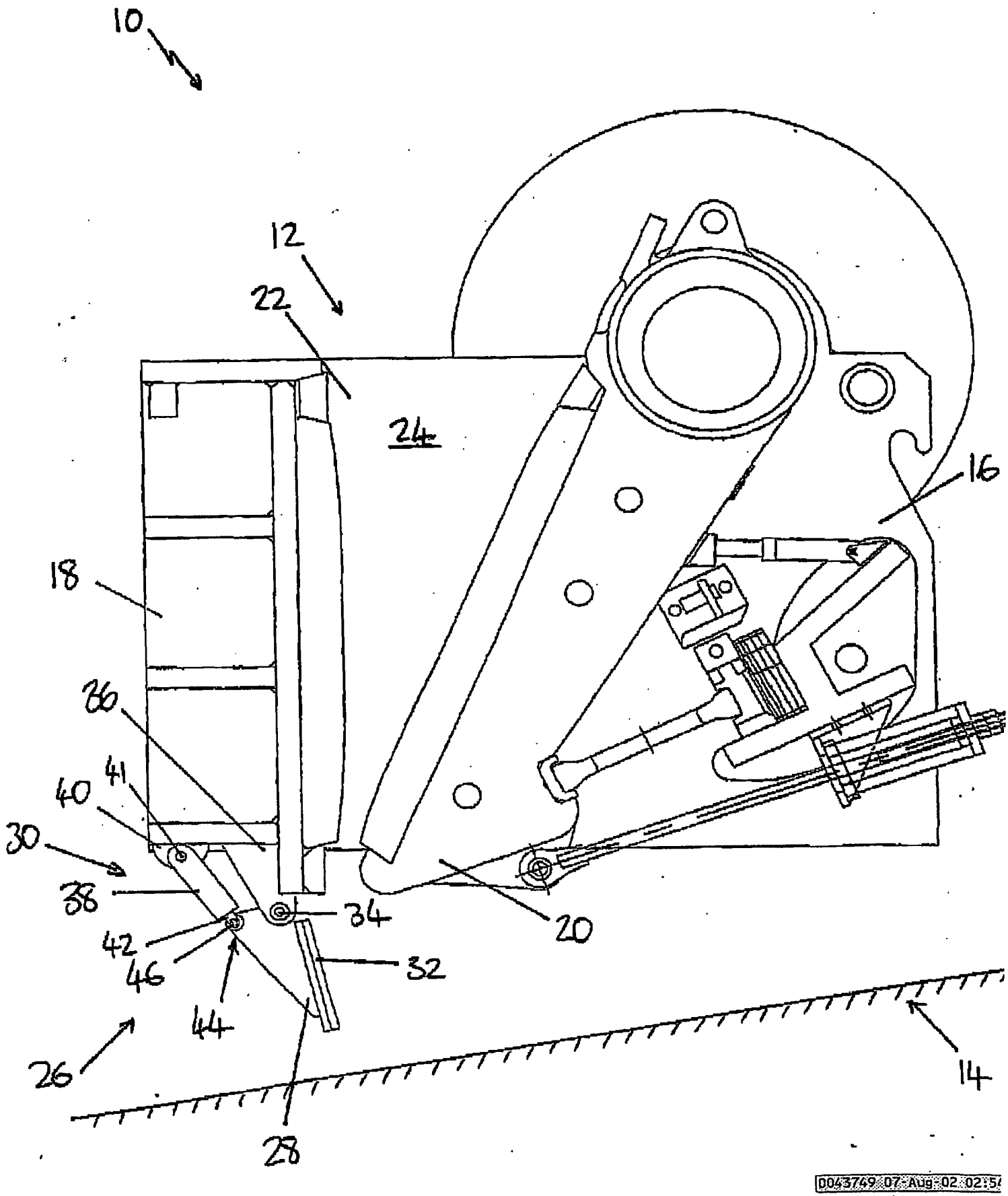

Figure 3